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Pesticide Fact Sheet Number 118
Aluminum and Magnesium Phosphide

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the ~~the~~ following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Washington, DC 20460

EPA

Pesticide Fact Sheet

Name of Chemical: ALUMINUM AND MAGNESIUM PHOSPHIDE
Reason for Issuance: AMENDMENT TO REGISTRATION STANDARD
Date Issued: FEB 20 1987
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1. Description of Chemicals

Generic Names: Aluminum Phosphide, Magnesium Phosphide
Trade Names: Phostoxin, Gastoxin, Quick Phos, Detia, etc.
EPA Shaughnessy Codes: 066501 (aluminum phosphide), 066504 (magnesium phosphide)
Chemical Abstracts Service (CAS) Numbers: 20859-73-8 and 12057-74-8
Year of Initial Registration: 1978 and 1979
Pesticide Type: Solid
Chemical Family: Inorganic Phosphides
U. S. Registrants: Degesch America, Inc.; Research Products Co.; Pestcon Systems, Inc.; Bernardo Chemicals Ltd., Inc.; Phos-Fume Chemical Co.; Woodbury Chemical Co. of Missouri; Alpha Chemical Co.

2. Use Patterns and Formulations

Application Sites: Indoor fumigation of agricultural food commodities, animal feeds, processed food commodities and non-food commodities (tobacco). Outdoor fumigation for burrowing rodent and mole control.

Application Rates: 30 tablets or 75 pellets per square foot for fumigation of mills and warehouses; 1-4 tablets or 5-20 pellets for rodent burrows.

Formulations: Tablets and pellets; powders in bags, envelopes and other types of containers.

3. Science Findings

Summary Science Statement: The Agency has determined that the registered uses of this chemical will not generally cause unreasonable adverse effects to humans or the environment if used in accordance with the approved use directions and revised precautionary statements prescribed by the registration standard.

Chemical Characteristics: Solid, dark gray material (granules or powder); molecular weight of aluminum phosphide is 57.96; molecular weight of magnesium phosphide is 134.779; material must be protected from moisture in the atmosphere in air-tight containers; contact of the solid material with moisture in the air, or with water, or acids release phosphine, a highly toxic gas.

Toxicology Characteristics: Requirements for acute toxicity data have been waived because of the well known extreme inhalation toxicity of phosphine gas which it generates. Accordingly, aluminum and magnesium phosphide have been placed in toxicity category I, the highest toxicity category.

No chronic toxicology studies are required with respect to dietary exposure because there is not potential for dietary exposure (tolerances are set at limit of detection).

Toxicology studies on phosphine gas are required to assess the margins of safety for exposed workers and applicators because the Agency does not have adequate data to determine whether phosphine may cause any long term adverse effects to humans. These studies include 90 day inhalation, teratogenicity and mutagenicity testing.

Environmental Characteristics: Aluminum and magnesium phosphide react with moisture or water to release phosphine gas, which eventually dissipates into the atmosphere. The resulting material from the reaction is aluminum or magnesium hydroxide, a relatively inert and innocuous material, which is a constituent of clay. Exposure (monitoring data) and related information are required to help assess the margins of safety for applicators and workers exposed to phosphine gas.

Ecological Characteristics: Phosphine is a highly toxic gas to a wide range of living organisms. Indoor uses pose no risk to non-target organisms outside of the site to be treated. Outdoor end use products (i.e., rodent and mole control) must bear special precautionary labeling to protect endangered species. Manufacturing use products must bear environmental hazard statements for wildlife.

Tolerance Assessment: Tolerances have been established for raw agricultural commodities at a level of 0.1 ppm (40 CFR 180.225 and 180.375); processed foods 0.01 ppm (21 CFR 193.20 and 193.225); and animal feeds 0.1 ppm (40 CFR 561.40 and 561.268). Finished food and feed must be held 48 hours prior to being offered to the consumer; tobacco fumigated in hogsheads must be aerated 72 hours.

4. Summary of Regulatory Position

--Aluminum and magnesium phosphide are Restricted Use Pesticides due to the extreme acute toxicity of phosphine gas which is released from the pesticide when it is exposed to moisture in the air. They may by used only by a certified applicator or by persons trained in accordance with the product manual working under the direct supervision and in the physical presence of the certified applicator. Physical presence means that the certified applicator must be available on the site or on the premises.

--Respiratory protection is not required if the fumigant is applied from outside of an enclosed indoor area. However, if the applicator enters an enclosed indoor area to apply the fumigant, a NIOSH/MSHA approved canister respirator is required at the site. Exposure during application may not exceed 0.3 ppm phosphine as an 8 hour time weighted average (TWA). Engineering controls such as forced air ventilation are recommended as the primary means of meeting the exposure standard. Otherwise, an approved respirator must be worn.

--Monitoring must be conducted with a low level detector device to assure that the exposure standard is not exceeded. A sufficient number of samples should be taken in places where worker exposure is likely to occur. It is recommended that the applicator or employer document exposure readings in an operation log or manual for each fumigation site. Once exposures have been adequately characterized for a particular site, subsequent monitoring is not routinely required for each aplication. However, spot checks should be made, especially if conditions significantly change or if a garlic odor is detected.

--If monitoring shows that exposure is less than the standard, no respirator is required. If more than 0.3 ppm TWA is encountered, a full face NIOSH/MSHA approved canister respirator is required up to 15 ppm phosphine. This type of respirator must be available during fumigation within an enclosed indoor area. If more than 15 ppm or unknown levels of phosphine are present, a NIOSH/MSHA approved self contained breathing apparatus (SCBA) is required. SCBA must be available at the site or locally such as at a fire department or rescue squad.

--After application, no person may be exposed to more than 0.3 ppm phosphine (maximum concentration). Examples are: if the fumigated site leaks into an adjacent indoor area, during transfer of treated commodity or during reentry into an incompletely aerated space.

--All entrances to a fumigated site must be placarded (except for railroad hopper cars which must be placarded on both sides near the ladders and on the top hatch where fumigant was applied). A placard may only be removed after the commodity is completely aerated. To determine whether aeration is complete, each fumigated site or vehicle must be monitored and shown to contain 0.3 ppm or less phosphine gas in the air space around and, when feasible, in the mass of the commodity. If more than 0.3 ppm is detected, the placard must be transferred with the treated commodity. Persons transferring or handling incompletely aerated commodities must be informed of the presence of phosphine and adequate measures taken to prevent exposure to more than 0.3 ppm.

--At least two trained persons must be present when the product is applied from within a space to be fumigated or during reentry into a fumigated or partially aerated space.

5. Summary of Data Gaps:

90 day inhalation study in rats
Teratogenicity study in one species
Mutagenicity battery
Exposure (monitoring data and related information for major sites)

6. Implementation of Labeling:

March 1, 1987 -- Registrants submit revised labeling.

March 15, 1987 -- EPA returns approved new product manuals and labels.

May 31, 1987 -- Cases of product entering commerce after this date must contain a new EPA approved product manual. A stamp or similar notice on the outside of the case will read:

"The use of aluminum (or magnesium) phosphide is required to be used in accordance with the procedures and safeguards described in the product manual dated _____. A copy of that manual is enclosed in this case. You are required to review this manual before using this pesticide. If you are purchasing less than a full case, your retailer or distributor must provide you, without charge, a copy of this manual. Notice to Retailers -- Each purchaser of this pesticide, whether by the case lot or less than a case lot, must receive a copy of the manual described in this notice."

The phrase "entering commerce" means that registrants may not release for shipment, distribute, sell offer for sale, hold for sale, ship, deliver for shipment, or receive and (having so received) deliver or offer to deliver, to any person products which do not meet these requirements after May 31, 1987.

January 31, 1988 -- All pesticide product containers must bear an EPA approved label which complies with the Registration Standard. In addition, an approved product manual must be in each case. After this date registrants may not release for shipment or other persons may not distribute, sell, offer for sale, hold for sale, ship, deliver for shipment, or receive and (having so received) deliver or offer to deliver, to any person products which do not meet these requirements.

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